A Structure Electroluminescence on the Base of Diamond-like Films: a-C:H

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An electroluminescence (EL) of the dark blue-light blue phosphorescence in an MOP structure with an active layer from diamond-like hydrogenized amorphous carbon (a-C:H) was observed. The quartz substrate is covered by the transparent ITO electrode, on which surface dielectric layers of Y_2O_3 and Al_2O_3, radiate layer a-C:H and a second electrode Mo are located. The layers of different optic width of "the forbidden band" (Eog) a-C:H are obtained by a high-frequency (13.56 MHz) plasma-chemical gas-phase precipitating method from an argon-methane mixture (10%CH_4 90% Ar) at different conditions of the precipitation (correlation E/p, where E is electric field strength, p is gas mixture pressure in the camera) [1]. The thickness of layers is controlled by the laser interferometer during growth. Contacts and dielectric layers are covered by the method magnetron sputtering. EL is observed visually at voltages U=120 V and with frequency f=6 kHz. To excite a photoluminescence (PL), we use a nitric laser ËÃÈ-505, with l=337.1 nm. A registration of the radiating spectra is made in the photon calculation regime. The spectra of EL is studied at U=150 V and f=6 kHz. The EL spectrum is the broadband with the half-width d=0.52 eV and with the radiation maximum Em=2.51 eV. For the PL, Emax=2.91 and d=0.6 eV. It should be noted that difference between maxima of EL and PL spectra is 0.4 eV independent of Eog of the active layer a-C:H. Probably, it indicates that recombination mechanisms are similar in both cases.

[1] A.A. Babaev, M.Sh. Abdulvagabov. Pisma v JTF. 15, ¹14, 75 (1989).